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ABSTRACT

To provide a communication method for children who are non-verbal due to hearing impairments, brain damage, or malformed oral structures, sign language and language boards have been utilized. However, these methods have limitations, and alternate means of communication have been explored. An Apple 2E computer with an echo speech synthesizer was programmed to meet the students' requirements, and a Muppet keyboard was attached for direct access by the students. Overlays, custom-designed for each student, were fitted onto the keyboard and contained functional vocabulary relating to school, daily activities, and feelings. The children pressed the desired word square to have the computer say that word or phrase. The augmentative device was used for communication with the teacher and other students and for academic lessons in reading, phonics, and math. Techniques are presented in this teacher-developed material for dealing with specific disabilities, such as visual impairments and students who cannot isolate a pointing finger. (JDD)

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AUGMENTATIVE COMMUNICATION WITH COMPUTER ASSIST

MY NAME IS GAY KINZER. I TEACH IN A SCHOOL FOR CHILDREN WHO ARE PHYSICALLY HANDICAPPED. I TEACH A SPECIAL CLASS WITHIN THE SCHOOL FOR CHILDREN WITH COMMUNICATION PROBLEMS. INCLUDED IN THIS CLASS ARE CHILDREN WHO ARE NON-VERBAL AND HEARING IMPAIRED AND SOME WHO ARE NON-VERBAL BUT NOT HEARING IMPAIRED. IN SOME CHILDREN THE ORAL STRUCTURE PREVENTS SPEECH. SOME OF THE CHILDREN ARE BRAIN DAMAGED CREATING DIFFICULTIES WITH EXPRESSIVE SPEECH.

THE CHILDREN ARE BEING TAUGHT SIGN LANGUAGE. BECAUSE I TEACH IN A SCHOOL FOR THE PHYSICALLY HANDICAPPED THE SIGNS HAVE TO BE MODIFIED TO MEET THEIR PHYSICAL LIMITATIONS. MOST PEOPLE OUTSIDE THE CLASSROOM ARE NOT ABLE TO READ SIGN LANGUAGE. PEOPLE WHO DO KNOW SIGN LANGUAGE SOMETIMES FIND IT DIFFICULT TO UNDERSTAND THE CHILDRENS SIGNING BECAUSE OF THE PHYSICAL MANNER IN WHICH THE CHILDREN MAKE THE SIGNS. THUS COMMUNICATION THROUGH SIGN LANGUAGE LIMITS THE NUMBER OF PEOPLE WITH WHOM THE CHILDREN CAN SPEAK.

FOR SOME STUDENTS A LANGUAGE BOARD WAS INTRODUCED. THIS CONSISTED OF A PIECE OF PAPER WITH PICTOGRAPHS OR SYMBOLS THAT THE CHILD WOULD POINT TO TO EXPRESS HIMSELF. THE CHILDREN WERE ABLE TO LEARN TO IDENTIFY THE SYMBOL AND WERE ABLE TO POINT TO IT ON THEIR BOARD. MANY CHILDREN COULD USE THESE BOARDS TO EXPRESS IDEAS BUT THE BOARDS WERE EXTREMELY LIMITING FOR TWO REASONS.

THE FIRST REASON : IT WAS DIFFICULT TO GET THE ATTENTION OF THE LISTENER SO HE COULD FOCUS IN ON THE BOARD WHILE THE CHILD WOULD POINT TO WHAT THE DESIRED STATEMENT WAS.

NOTHING COULD HAPPEN UNTIL THE ATTENTION OF THE LISTENER WAS OBTAINED. CHILDREN WOULD HAVE TO TAP PEOPLE, TRY TO APPROACH PEOPLE WITH THE BOARD OR USE

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WHATEVER MEANS THEY WERE PHYSICALLY CAPABLE OF DOING TO GAIN ATTENTION.

THE SECOND REASON : EACH SPACE ON THE LANGUAGE BOARD HELD A ONE WORD CONCEPT. SYMBOLS COULD BE PUT TOGETHER TO GIVE MESSAGES BUT THIS PROCESS WAS SLOW AND REQUIRED TIME AND PATIENCE ON THE PART OF THE SPEAKER AND THE LISTENER.

SOME OF MY STUDENTS FUNCTION AT A TRAINABLE LEVEL AND COMBINING SYMBOLS WAS A DIFFICULT TASK. MOST STUDENTS PREFERRED TO POINT TO ONE OR TWO SPACES AND LET THE LISTENER GUESS UNTIL HE GOT THE CORRECT INTERPRETATION OF THE MESSAGE.

BECAUSE OF THESE LIMITATIONS I BEGAN TO LOOK INTO THE MECHANICAL DEVICES THAT WERE BEING PRODUCED AS ALTERNATE MEANS OF COMMUNICATION. IN MANY OF THE MACHINES SPEECH WAS POOR, CODING THE MESSAGES WAS DIFFICULT, THE MACHINES WERE HEAVY AND NOT FUNCTIONAL FOR AMBULATORY STUDENTS. THE COSTS OF THE DEVICES WERE FAR GREATER THAN MOST PEOPLE COULD AFFORD.

THUS WHEN MY SCHOOL OBTAINED COMPUTERS I DECIDED TO TRY TO USE THE COMPUTER TO ALLOW THE CHILDREN TO "SPEAK".

I ENLISTED THE ASSISTANCE OF THE COMPUTER PROGRAMER FOR THE DISTRICT. I DESIGNED A PROGRAM TO MEET MY STUDENTS NEEDS AND THE PROGRAMER PROGRAMED THE DISK ACCORDING TO MY REQUIREMENTS.

I USE AN APPLE 2 E COMPUTER WITH AN ECHO SPEECH SYNTHESIZER. A MUPPET KEYBOARD IS ATTACHED FOR DIRECT ACCESS BY THE STUDENT TO HIS VOCABULARY.

THERE IS AN OVERLAY OF SYMBOLS FOR EACH STUDENT THAT FITS OVER THE MUPPET KEYBOARD. EACH STUDENT HAS HIS OWN SET OF WORDS ON AN OVERLAY AND THERE ARE OVERLAYS THAT ALL STUDENTS CAN USE.

THE PRIMARY WORD LIST CONSISTS OF FUNCTIONSL VOCABULARY THE STUDENTS WOULD USE AT SCHOOL AND HOME. THE OVERLAY WOULD HAVE ADULTS AND CHILDREN REPRESENTED, SCHOOL ITEMS, DAILY ACTIVITIES AND FEELINGS.

WHEN THE MUPPET KEYBOARD IS ATTACHED TO THE COMPUTER AND THE OVERLAY IS

INSERTED INTO THE MUPPET KEYBOARD THE CHILD THEN PRESSES THE DESIRED WORD SQUARE AND THE COMPUTERS VOICE OUTPUT SAYS THE WORD OR PHRASE. THIS ENABLES THE LISTENER TO HEAR THE STATEMENT BEING MADE BY THE CHILD. WITH THIS SYSTEM THE LISTENER DOES NOT HAVE TO BE VISUALLY OBSERVING THE COMMUNICATION BOARD TO KNOW THE CHILD WANTS TO SPEAK. WITH THIS SYSTEM THE CHILD CAN INITIATE CONVERSATION AT ANY TIME. THE CHILD CAN MAKE STATEMENTS DURING GROUP DISCUSSIONS, ANSWER QUESTIONS OR TALK WITH HIS FRIENDS,

IN THE CLASSROOM SETTING IT IS EXTREMELY IMPORTANT THAT THE CHILD BE ABLE TO "TALK" TO GAIN THE ATTENTION OF HIS CLASSMATES AND TEACHERS. SOME OF THE STUDENTS ARE NOT PHYSICALLY CAPABLE OF REACHING OUT TO TOUCH OTHERS TO GAIN ATTENTION AND THUS NEEDED A VOICE IN ORDER TO BE INCLUDED IN ACTIVITIES. WITH MY AUGMENTATIVE COMMUNICATION DEVICE THE CHILD IS NOW ABLE TO GAIN THE ATTENTION OF THE LISTENER BY CALLING HIS OR HER NAME.

WITH MY AUGMENTATIVE COMMUNICATION DEVICE EACH SQUARE ON THE OVERLAY CAN BE A COMPLETE THOUGHT BECAUSE MORE THAN ONE WORD CAN BE PUT IN THE SQUARE WITH A SINGLE SYMBOL REPRESENTING THE PHRASE THE CHILD WISHES TO COMMUNICATE.

THE MUPPET KEYBOARD WAS CHOSEN AS AN ACCESSING DEVICE TO THE COMPUTERS VOICE OUTPUT BECAUSE IT WAS BASED ON A GRID PATTERN WITH SPACES THAT COULD BE EASILY PRESSED DOWN BY ANY OF THE STUDENTS. WITH THE GRID FORMAT OF THE MUPPET KEYBOARD A STANDARD STYLE LANGUAGE BOARD COULD BE USED.

THE CHILDS NEEDS AND DESIRES HAVE TO BE CONSIDERED IN MAKING A COMMUNICATION DEVICE. HIS ABILITY TO UNDERSTAND PICTORIALS, SYMBOLS, WORD AND LETTER COMBINATIONS AS A MEANS OF USING THE AUGMENTATIVE DEVICE HAS TO BE CONSIDERED. THE FUNCTIONAL USE OF THE BOARD AND PHYSICAL LIMITATIONS OF THE STUDENT ALSO NEED TO BE CONSIDERED IN MAKING CHIOCES FOR THE SYLE OF PRESENTATION OF THE COMMUNICATION BOARD.

FOR SOME STUDENTS THE ABILITY TO PRESS DOWN IN ONE PLACE IS RESTRICTED DUE TO IMPAIRMENTS IN THE FINE AND GROSS MOTOR AREAS. FOR THESE STUDENTS THE SIZE OF THE SQUARE CAN BE MADE LARGER. ANY SIZE SQUARE CAN BE USED THAT IS FUNCTIONAL. THE OVERLAY DESIGN WILL ACCOMMODATE THE SIZE SYMBOL DESIRED. THE MUPPET KEYBOARD WILL BE CODED ACCORDING TO THE SIZE SQUARE PICKED.

FOR ONE OF MY STUDENTS AN ADAPTIVE DIVICE TO PRESS DOWN WITH WAS REQUIRED. WHEN HE INITIALLY BEGAN USING THE COMMUNICATION DEVICE HE COULD NOT ISOLATE ONE FINGER FOR POINTING. HE HAD A LARGE VOCABULARY AND DID NOT REQUIRE LARGER SIZE SQUARES FOR COMPREHENSION. SO I GAVE HIM A LARGE PEG WHICH HE COULD GRASP EASILY AND COULD THEN PRESS DOWN ON ONE SMALLER SPACE. THUS HE WAS ABLE TO HAVE A LARGER VOCABULARY ON HIS OVERLAY. THE OVERLAY HAS A PLASTIC COVERING ON IT BECAUSE THE OVERLAY NEEDS TO BE PROTECTED FROM EXCESSIVE DROOL. THE PEG WOULD SLIP SOMETIMES ON THE PLASTIC COVERING. I PUT SANDPAPER ON THE TIP OF THE PEG AND THIS MADE THE PEG STAY WHERE THE CHILD PLACED IT. AT THIS TIME HE HAS DEVELOPED THE ABILITY TO USE HIS THUMB TO PRESS DOWN ON THE SQUARES AND NOW PREFERS THIS TO THE PEG.

ONE OF MY STUDENTS IS CONSIDERED LEGALLY BLIND AND IN THIS STUDENTS CASE IT IS IMPORTANT TO MAKE SURE THERE IS A DISTINCTION BETWEEN FOREGROUND AND BACKGROUND. FOR THIS STUDENT A SMALLER PRESENTATION OF THE SYMBOL IS BETTER BECAUSE HE HAS A VERY NARROW FIELD OF VISION AND LARGER PRESENTATIONS GO OUTSIDE OF THE AREA OF HIS VISION. HE, LIKE MOST OF THE STUDENTS, LEARNS WHERE THE VARIOUS SYMBOLS ARE ON THE BOARD AND KNOWS WHERE TO PRESS FOR DESIRED WORDS OR STATEMENTS.

THE MAJORITY OF MY STUDENTS USING THIS AUGMENTATIVE DEVICE ARE CONSIDERED TRAINABLE MENTALLY RETARDED. FOR THESE STUDENTS I USE PICTORIAL REPRESENTATIONS. THE PICTORIALS HAVE BEEN TAUGHT TO THE CHILD SO HE HAS AN UNDERSTANDING OF WHAT THE PICTURE REPRESENTATION MEANS. MOST OF THE COMMON OBJECTS ARE LEARNED WITHIN A REASONABLE TIME.

FOR PEOPLE IN THE CLASSROOM I FIND IT BEST TO USE PHOTOGRAPHS. THE STUDENTS ARE ABLE TO RECOGNIZE THE PHOTOS RIGHT AWAY. WHEN THEY PRESS DOWN ON THE PHOTO ON THE OVERLAY THEY IMMEDIATELY LEARN THE ADVANTAGES OF THIS AUGMENTATIVE COMMUNICATION DEVICE. AS THEY PRESS ON THE PHOTO OF A PERSON THE NAME IS SAID THROUGH THE VOICE OUTPUT AND THAT PERSON HEARS IT AND MAKES A RESPONSE. THE CHILDREN LEARN THAT PRESSING ON ONE OF THE SQUARES GAINS ATTENTION.

TWO STUDENTS I HAVE ARE IN A HIGHER RANGE INTELLECTUALLY AND THEY USE THE AUGMENTATIVE DEVICE DURING ACADEMIC LESSONS. THE STUDENTS USE THE BOARD DURING READING. ONE OF THE STUDENTS READS PASSAGES USING THE BOARD. HE ALSO ANSWERS QUESTIONS IN RELATION TO THE MATERIAL READ. ONE STUDENT IS JUST BEGINNING TO LEARN TO READ AND READS INDIVIDUAL WORDS ONLY. BOTH OF THESE STUDENTS CAN VERBALIZE BUT THEIR ARTICULATION IS SO POOR IT IS EXTREMELY DIFFICULT TO UNDERSTAND WHAT THEY ARE SAYING. IN THE READING BOOKS MANY WORDS ARE FROM THE SAME WORD FAMILY AND FOR CLARITY AND UNDERSTANDING THE AUGMENTATIVE DEVICE HAS BEEN OF GREAT IMPORTANCE. BOTH BOYS ARE ALSO ABLE TO USE THE DEVICE TO DO PHONICS AND MATH. IN PHONICS THEY CAN TELL THE NAME OF THE SOUNDS BY PRESSING ON THE APPROPRIATE LETTER SQUARE. FOR EXAMPLE WHEN GOING OVER THE INITIAL CONSONANT SOUND OF BALL THE STUDENT WOULD PRESS ON THE LETTER "B" SQUARE. IN MATH THE STUDENT CAN COUNT OBJECTS BY PRESSING ON THE NUMBER SQUARES. WHEN DOING VERY ELEMENTARY MATH PROBLEMS THE STUDENT ANSWERS THE QUESTION BY PRESSING ON THE CORRECT NUMBER SQUARE.

ONE OF THE STUDENTS USES A LETTER CODING SYSTEM RATHER THAN PICTORIALS. EACH LETTER REPRESENTS AN ENTIRE STATEMENT. FOR EXAMPLE: "F" MEANS "I LOVE MY FRIENDS" AND "G" MEANS "DO I HAVE GYM TODAY?"

SOME STUDENTS WILL BE ABLE TO HELP DECIDE ON CODES AND IDEAS THEY WANT ON THEIR BOARDS. CERTAIN STUDENTS MAY HAVE FAVORITE EXPRESSIONS, PEOPLE OR ITEMS THEY MAY WANT ON THEIR BOARDS.

THIS COMMUNICATION DEVICE CAN GROW WITH THE CHILD. AS THE CHILD ADVANCES MODIFICATIONS CAN BE MADE. SINCE AN OVERLAY SYSTEM IS USED SEPARATE OVERLAYS ARE MADE FOR VARIOUS TOPICS SUCH AS FOOD OR ANIMALS. THE COST OF THE MUPPET KEYBOARD IS NOT GREAT SO IT IS EASILY OBTAINABLE FOR A CLASSROOM OR THERAPUTIC SITUATION. THE OVERLAYS I MAKE MYSELF. MY OVERLAYS ARE COVERED WITH PLASTIC TO PROTECT THEM AS SOME OF MY STUDENTS DROOL EXCESSIVELY. SINCE THE OVERLAYS CAN COME OFF OF THE MUPPET KEYBOARD THE STUDENTS CAN TAKE THE OVERLAYS HOME. THE MUPPET KEYBOARD MUST BE ATTACHED TO THE COMPUTER. THERE IS NO VOICE OUTPUT UNLESS THERE IS ACCESS TO A COMPUTER WITH AN ECHO SPEECH SYNTHESIZER. ALTHOUGH THIS IS A DISADVANTAGE I HAVE BEEN ABLE TO GIVE my STUDENTS AN AUGMENTATAIVE COMMUNICATION DEVICE AT A REASONABLE COST WHEN THEY WOULD HAVE NO DEVICE WITHOUT THIS CREATION.

THE STUDENTS USING THIS COMMUNICATION DEVICE LIKE IT. ACTUALLY THEY LOVE IT. THEY ARE VERY POSITIVE ABOUT USING IT. THEY UNDERSTAND THEY CAN COMMUNICATE USING THIS DEVICE. THE HEARING IMPAIRED AND DEAF STUDENTS UNDERSTAND THAT THE DEVICE IS SPEAKING FOR THEM AND GAINING THE ATTENTION OF OTHERS AND GIVES THEM INFORMATION. ONE STUDENT NOW LEADS THE CLASS IN THE PLEDGE OF ALLEGIENCE TO THE FLAG RATHER THAN BEING UPSET BECASUE HE COULD NOT SAY THE WORDS.

AT HOLIDAY TIMES THE CHILDREN CAN TALK ABOUT THE SPECIAL ACTIVITIES AND PEOPLE ASSOCIATED WITH THE HOLIDAY. AT CHRISTMASTIME ONE STUDENT WAS ABLE TO CALL SANTA CLAUS OVER TO HIM. AT EASTER TIME ONE STUDENT CAME INTO THE CLASSROOM WITH AN EASTER BUNNY HE HAD MADE. VOCABULARY FOR EASTER HAD JUST BEEN PUT ON THE BOARD. A STUDENT SAW THE BUNNY AND USING HIS COMMUNICATION DEVICE IMMEDIATELY PRESSED THE EASTER BUNNY SYMBOL ACKNOWLEDGING THE WORK OF HIS FRIEND.

THE CHILDREN CAN CALL THEIR FRIENDS AND TEACHERS BY NAME, AND THEY CAN TELL PEOPLE WHAT THEY WANT OR NEED.

THE VERBAL STUDENTS IN THE CLASSROOM ENJOY USING THE COMMUNICATION DEVICE WITH

THE NON-VERBAL STUDENTS. THE VERBAL STUDENTS LIKE TO GIVE MESSAGES ON THE DEVICE TO THE NON-VERBAL STUDENTS AND ASSIST THEM IN LEARNING THE VARIOUS SYMBOLS. THE VERBAL STUDENTS LIKE TO INTERACT WITH THE NON-VERBAL STUDENTS USING THIS DEVICE. THIS HAS HELPED THE NON-VERBAL STUDENTS UNDERSTAND THE VALUE OF THE DEVICE FOR COMMUNICATION AND SEE THE DEVICE AS SOMETHING VERY SPECIAL. OVERALL IT HELPS THE NON-VERBAL STUDENT BE A PART OF WHAT IS HAPPENING AND HELPS TO ESTABLISH RELATIONSHIPS WITH OTHER CHILDREN. THE STUDENTS WHO USE THIS DEVICE FEEL SPECIAL, FEEL THEY ARE A PART OF CLASS ACTIVITIES, FEEL THEY ARE A CONTRIBUTING MEMBER OF THE CLASS.

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